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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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10/676,585

09/30/2003

Shriram Ramanathan

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03/16/2006

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EXAMINER

NGUYEN, TUAN H

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 03/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/676,585

Applicant(s)

RAMANATHAN ET AL.

Examiner

Tuan H. Nguyen

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-28 is/are pending in the application.
- 4a) Of the above claim(s) 1-10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/10/06 has been entered.

Election/Restrictions

Applicant's argument regards to the restriction of claims 27-28 based on the original presentation in the reply filed on 1/10/06 is acknowledged. The traversal is on the ground(s) that they are related to the elected invention. This is found persuasive.

The restriction requirement is hereby withdrawn.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 11-12, 15-21, 25-28 are rejected under 35 U.S.C. 102(e) as being anticipated by Macris'330 (cited ref.).

Macris, figs. 1-20 and related text, particularly figs. 8A-8C discloses the claimed wafer assembly comprising a bare wafer 35 (fig. 8B, and paragraph [0113]); an active wafer 60 having at least an active device 62 (fig. 8A, and paragraph [0112]) bonded to the bare wafer 56 by the backside (fig. 8C, paragraph [0113]); at least a thermoelectric film 28 on the bare wafer 35 located at a location matched to an area (active circuitry 62) on the active wafer 60 that needs thermal control (fig. 8C). Paragraph [0075], lines 1-5 discloses the heat source 10 may be an IC chip or other electronic component that needs thermal control. The heat source 10 corresponds to a localized hot spot on the active wafer that needs thermal control to dissipate heat. Paragraph [0077] also discloses that "This thermal anisotropy or directional heat transfer, is more effective at removing thermal energy from a localized heat source than conventional materials such as metal."

With respect to claims 15-19, 26, fig. 8C shows the thin active wafer 58 is bonded to the bare wafer 56 through an interlayer 64 in alignment, and the thermoelectric film 28 having heat absorbing junction 30 fabricated at location corresponding to a localized hot spot on the active wafer to maximize heat spreading (see paragraphs [0114]- [0120]).

With respect to claim 12, see paragraph [0079].

With respect to claims 20, 21, 27, 28, see fig. 2, wherein the bare wafer 28 has power signal 22 to control the at least thermoelectric film (paragraph [0077]).

Claims 11-28 are rejected under 35 U.S.C. 102(e) as being anticipated by Cordes et al. (cited ref.).

Cordes, figs. 2A-2C and text on col. 4-6 teaches the claimed wafer assembly including a bare wafer 339 having a backside; an active wafer 302 bonded to the bare wafer 339 by the backside, the active wafer 302 having at least and active device formed in layer 309 (col. 4, third paragraph); and at least a thermoelectric film 358, 360 on the bare wafer 339 (fig. 2B) located at a location matched to an area (localized hot spot) on the active wafer 302 that needs thermal control (col. 7, lines 58-64).

With respect to claims 12-14, 22-24, see col. 5, second paragraph, col. 6, first paragraph.

With respect to claims 20, 21, 27, 28, see col. 6, last 4 lines.

With respect to claims 16-19, 26, fig. 2c and col. 6, thin wafer 302 is bonded to bare wafer 339 in alignment through an interlayer coated bond solder 334, 336, 364, 366 by heating.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 11-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cordes et al. (cited ref.) in view of Ghoshal (US 6,222,133).

Cordes et al., figs. 2C and text on col. 6, lines 5-11 teaches the use of a desired of composition of Bi, Sb,Te for forming thermoelectric element on a substrate to remove heat at a location matching the heat dissipation of the juxtaposed integrated circuit of the die (col. 7, lines 59-60) as explained above.

Cordes does not clearly show the thermoelectric element at a specific location of the die that needs thermal control; however, Ghoshal, in a related art as shown in fig. 9 and related text on col. 8, teaches the thermoelectric element is selectively bonded to parts of an integrated circuit chip for purposes of removing heat at selective region of an integrated circuit.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have formed the thermoelectric element by using well-known alloy of Bi,Te or Sb, Te, or Zn, Sb composition at a specific location on a chip as generally disclosed by Cordes and specifically shown by Ghosha for removing heat from the integrated circuit or other electronic components, and improving the device performance.

Response to Arguments

Applicant's arguments filed 1/10/06 have been fully considered but they are not persuasive.

With respect to the applicant's argument on page 7, third paragraph, and page 8, third and fifth paragraphs, the instant claims do not exclude the formation of thermoelectric film at the other location or entire area on the surface of the chip; moreover, the whole surface of the chip in Macris and Cordes needs thermal control, therefore the thermoelectric element located at a location that matched to an area on the active wafer that needs thermal control as recited is read on the references. Note also in paragraph [0075], lines 4-5, paragraph [0077], last three lines that discloses the heat source from an IC chip of electronic component (localized heat source).

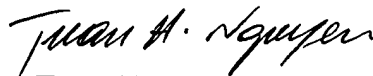
With respect to the fourth paragraph of pages 7, 8, the thermoelement from Macris is the same as in the instant thermoelectric film regardless of how it is made.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Freeman et al. discloses a related thermoelectric film.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan H. Nguyen whose telephone number is 571-272-1694. The examiner can normally be reached on 9AM-5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Tuan H. Nguyen
Primary Examiner
Art Unit 2813